In re Patent Application of:
KANE ET AL
Serial No. **10/662,086**
Filed: **09/12/03**

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IN THE CLAIMS

1. - 3. (Cancelled)

4. (Currently Amended) ~~The apparatus of claim 3,~~

A laser apparatus comprising:

a Neodymium-doped lasing material,

wherein the lasing material includes a first-surface that is substantially transparent to a pump radiation and substantially reflective to a laser radiation generated by an interaction between the pump radiation and the Neodymium-doped lasing material, and a second surface that transmits at least a portion of the laser radiation; and

wherein the laser radiation is characterized by a vacuum wavelength corresponding to an atomic transition from the $^4F_{3/2}$ level to the $^4I_{9/2}$ level of Neodymium in the lasing material;

a passive Q-switch optically coupled to the second surface of the lasing material;

wherein the lasing material and the Q-switch are configured to produce pulses of the laser radiation;

wherein the lasing material is $Nd:YVO_4$;

wherein the pulses are characterized by a pulse length of greater than zero and less than about 1.5 nanoseconds and a pulse repetition rate greater than about 100 kHz; and

wherein the Neodymium concentration in the lasing material is greater than about 1% and less than

about 3%.

5. (Original) The apparatus of claim 4 wherein the Neodymium concentration in the lasing material is about 2%.

6. (Currently Amended) The apparatus of claim [[3]] 4 wherein the lasing material is between about 50 microns thick and about 100 microns thick.

7. (Currently Amended) The apparatus of claim [[3]] 4 wherein the first surface of the lasing material is configured to transmit between about 0.5% and about 2% of the laser radiation incident upon it from within the lasing material.

8. (Original) The apparatus of claim 7 wherein the first surface of the lasing material is configured to transmit about 1% of the laser radiation incident upon it from within the lasing material.

9. (Original) The apparatus of claim 8 wherein the first surface is configured to transmit about 0.94% of laser radiation of the ordinary polarization and about 0.98% of laser radiation of the extraordinary polarization.

10, - 21. (Cancelled)

22. (Previously Presented) A laser apparatus comprising:

a Neodymium-doped lasing material, wherein the lasing material includes a first-surface that is substantially transparent to a pump radiation and substantially reflective to laser radiation generated by an interaction between the pump radiation and the Neodymium-doped lasing material, wherein the laser radiation is characterized by a vacuum wavelength corresponding to an atomic

transition from the $^4F_{3/2}$ level to the $^4I_{9/2}$ level of Neodymium in the lasing material, the lasing material further having a second surface that transmits at least a portion of the laser radiation; and

a passive Q-switch optically coupled to the second surface of the lasing material; and

wherein the lasing material and the Q-switch are configured to produce pulses of the laser radiation;

wherein the pulses are characterized by a pulse length of greater than zero and less than about 1.5 nanoseconds and a pulse repetition rate greater than about 100 kHz;

wherein the Q-switch includes a saturable Bragg reflector (SBR);

wherein the SBR includes a substrate, semiconductor mirror stack having alternating high and low refractive index layers, a quantum well stack having between about 3 and about 15 quantum wells, and a dielectric overcoat;
wherein the semiconductor mirror stack is disposed between the substrate and the quantum wells;
wherein the quantum well stack is disposed between the semiconductor mirror stack and the dielectric overcoat;
wherein the dielectric overcoat includes alternating layers of SiO_2 and HfO_2; and
wherein the dielectric overcoat has a reflectivity of between about 87% and about 96% at the wavelength of the laser radiation from the Neodymium-doped lasing material.

23. (Original) The apparatus of claim 22 wherein the dielectric overcoat has a reflectivity of greater than about 90% at the wavelength of the pump radiation.

24. - 31. (Cancelled)

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32. (Currently Amended) ~~The PQSL of claim 31,~~

A passively Q-switched laser (PQSL), comprising:

a source of pump radiation;

a Neodymium-doped lasing material, wherein the lasing material includes a first-surface that is substantially transparent to the pump radiation and substantially reflective to laser radiation characterized by an electronic transition from the $^4F_{3/2}$ level to the $^4I_{9/2}$ level of Neodymium in the lasing material, the lasing material further having a second surface that transmits at least a portion of the laser radiation; and

a passive Q-switch optically coupled to the second surface of the lasing material;

wherein the source of pump radiation, lasing material and Q-switch are configured to produce pulses of laser radiation characterized by a wavelength corresponding to an electronic transition from the $^4F_{3/2}$ level to the $^4I_{9/2}$ level;

wherein the pulses are characterized by a pulse length of greater than zero and less than about 1.5 nanoseconds and a pulse repetition rate greater than about 100 kHz;

wherein the lasing material is $Nd:YVO_4$; and

wherein the Neodymium concentration in the lasing material is greater than about 1% and less than about 3%.

33. (Original) The PQSL of claim 32 wherein the Neodymium concentration in the lasing material is about 2%.

34. (Currently Amended) The PQSL of claim [[31]] 32 wherein the lasing material is between about 50 microns thick and about 100 microns thick.

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35. (Currently Amended) The PQSL of claim [[31]] 32 wherein the first surface of the lasing material is configured to transmit between about 0.5% and about 2% of the laser radiation incident upon it from within the lasing material.

36. (Original) The PQSL of claim 35 wherein the first surface of the lasing material is configured to transmit about 1% of the laser radiation incident upon it from within the lasing material.

37. (Original) The PQSL of claim 36 wherein the first surface is configured to transmit about 0.94% of laser radiation of the ordinary polarization and about 0.98% of laser radiation of the extraordinary polarization.

38. - 42. (Cancelled)

43. (Currently Amended) ~~The apparatus of claim 42,~~

An apparatus for producing blue light comprising:

a neodymium-doped cladding-pumped fiber device for amplifying laser radiation;

an optical harmonic generator optically coupled to the fiber device for increasing a frequency of the laser radiation to produce a blue output radiation; and

a passively Q-switched laser (PQSL) optically coupled to the neodymium-doped cladding-pumped fiber device, wherein the PQSL is configured to produce the laser radiation, the laser radiation having a harmonic that is blue, whereby the harmonic generator interacts with the laser radiation to produce blue light,

wherein the PQSL includes:

a source of pump radiation;

a Neodymium-doped lasing material, wherein the lasing material includes a first-surface that is substantially transparent to the pump radiation and substantially reflective to laser radiation characterized by a by an electronic transition from the $^4F_{3/2}$ level to the $^4I_{9/2}$ level of Neodymium in the lasing material, the lasing material further having a second surface that transmits at least a portion of the laser radiation; and

a passive Q-switch optically coupled to the second surface of the lasing material;

wherein the source of pump radiation, lasing material and Q-switch are configured to produce pulses of the laser radiation characterized by a wavelength corresponding to an electronic transition from the $^4F_{3/2}$ level to the $^4I_{9/2}$ level;

wherein the pulses are characterized by a pulse length of greater than zero and less than about 1.5 nanoseconds and a pulse repetition rate greater than about 100 kHz;

wherein the lasing material is Nd:YVO_4; and

wherein the Neodymium concentration in the lasing material is greater than about 1% and less than about 3%.

44. (Original) The apparatus of claim 43 wherein the Neodymium concentration in the lasing material is about 2%.

45. (Currently Amended) The apparatus of claim [[42]] 43 wherein the lasing material is between about 50 microns thick and about 100 microns thick.

46. (Currently Amended) The apparatus of claim [[42]] 43 wherein the first surface of the lasing material is configured to

transmit between about 0.5% and about 2% of the laser radiation incident upon it from within the lasing material.

47. (Original) The apparatus of claim 46 wherein the first surface of the lasing material is configured to transmit about 1% of the laser radiation incident upon it from within the lasing material.

48. (Original) The apparatus of claim 47 wherein the first surface is configured to transmit about 0.94% of laser radiation of the ordinary polarization and about 0.98% of laser radiation of the extraordinary polarization.

49. - 55. (Cancelled)